to walk promptly on crutches, and was ordinarily able to resume normal athletic activities within one to four days. No restrictions whatever were placed on the early use of the upper extremity muscles. Recurrence at the injured site did not occur, and there was no evidence of myositis ossificans in nine patients examined one year after injury.

WALTER J. TREANOR, MD

REFERENCES

Jackson DW, Feagin JA: Quadriceps contusions in young athletes. J Bone Joint Surg 55:95-105, Jan 1973

Berne RM, Levy MN: The peripheral circulation and its regulation, *In* Cardiovascular Physiology, 2nd Ed. St. Louis, CV Mosby Co, 1972

Dantrolene Sodium in the Management of Spasticity

SPASTICITY THAT IS CAUSED by central nervous system involvement often induces contractures and deformities, limits the patient's capacity to care for himself, impairs gait, and makes personal hygiene and nursing care more difficult. The pharmacologic management of severe spasticity has continued to be relatively ineffective, even since the introduction of the so-called "muscle relaxants." In efforts to modify or abolish spasticity, clinicians have had to resort to various nonpharmacologic measures, such as chemical nerve and motor point blocks (alcohol, phenol), surgical tendon lengthenings and releases, rhizotomy, spinal cord hypothermia and, more recently, stereotaxic surgery.

Today, the pharmacologic agent most widely used for the treatment of spasticity is diazepam (Valium®); but this drug, since it is principally a centrally acting relaxant, seldom reduces severe spasticity without simultaneously sedating the patient to the degree that function is hindered rather than enhanced.

A peripherally acting skeletal muscle relaxant, dantrolene sodium (Dantrium®), was recently introduced. Thus far, comparative clinical and electrophysiological studies have indicated that it is more effective than diazepam in the treatment of spasticity. It has benefited some patients, though a number fail to respond to the new drug. Some patients seem to derive greater benefit from dantrolene and diazepam combined than from either drug alone. Consequently, before resorting to an irreversible nonpharmacologic procedure intended to modify or abolish spasticity, the clinician should consider a trial of dantrolene sodium. Side effects (the most common is general weakness) are usually transient, and may be minimized by starting with relatively small doses, that is, 25 mg twice daily, and increasing this in 25-mg increments until the adult patient is receiving 100 mg four times daily.

If dramatic change is anticipated, dantrolene may prove disappointing; but the drug does represent a new mode of action as a muscle relaxant in that it has a peripheral effect. Studies indicate that it uncouples excitation-contraction, probably by interfering with or inhibiting calcium release from within the sarcoplasmic retriculum of muscle. Neuropharmacologic advances may ultimately lead to the development of dantrolene-like compounds or derivatives that will prove to be more widely effective. The availability of such compounds would facilitate the pharmacologic management of these patients, and reduce the necessity to resort to nonpharmacologic measures to modify or abolish spasticity.

ALVIN GLASS, MD

REFERENCES

Ellis KO, Carpenter JF: Studies on the mechanism of action of dantrolene sodium—A skeletal muscle relaxant. Naunyn-Schmiedebergs Arch Pharmacol 275:83-94, 1972

Herman R, Mayer N, Mecomber SA: Clinical pharmaco-physiology of dantrolene sodium. Am J Phys Med 51:296-311, Dec 1972

Putney JW Jr, Bianchi CP: Effect of dantrolene on E-C coupling in skeletal muscle (Abstract 3145). Fed Proc 32:772 (Abs), Mar 1973

Intermittent Catheterization and Bladder Rehabilitation: Its Role in Spinal Cord Injury Patients

EARLY RESULTS of intermittent catheterization in patients with traumatic spinal cord lesions show considerable reduction in persistent urinary tract infection and pronounced reduction in other complications, including vesico-ureteral reflux, hydronephrosis, pyelonephritis, calculous disease, penoscrotal abscesses and fistulas.

A study was done at VA Hospital and Baylor College of Medicine, Houston, Texas on 117 patients in whom Foley indwelling catheters were placed for periods of less than three weeks to more than five years. After a detailed urological work-up, these patients were put on a program of intermittent catheterization including self-catherization in paraplegics. At first, the catheterizations were done every four hours, day and night, until some spontaneous voiding (bladder triggering) was noticed. The schedule then was changed to every

six hours. The frequency of catheterization was gradually reduced with increasing spontaneous voiding. The procedure was stopped when the residual urine was less than 150 ml. The period of intermittent catheterization varied from 39 to 138 days (mean 79 days) in acute patients and 3 to 25 days in chronic patients. A separate program was used for acute and chronic patients. The patient's profile of fluid balance and urinary culture was done before the start of intermittent catheterization. All catheterization was done aseptically by paramedical personnel and all paraplegic patients were trained to catheterize themselves. The role of bethanechol chloride as a bladder assist for decreasing period of intermittent catheterization has also been evaluated. Optimal dosage which halved the period of catheterization has also been established. Almost all patients with Foley indwelling catheters at the start of intermittent catheterization were infected; however, after intermittent catheterization about 75 percent were infection free. Overall 92 percent catheter-free status was achieved without operation on the bladder neck. One of the important goals was to do minimal operation, and a conservative bladder neck sphincterotomy to avoid incontinence has been advocated. Such an operation was done on six patients and the results improved to 98 percent catheter-free status.

INDER PERKASH, MD

REFERENCES

Guttman L, Frankel H: Value of intermittent catheterization in early management of traumatic paraplegia and tetraplegia. Paraplegia 4:63-84, Aug 1966

Perkash I: Intermittent catheterization: The urologist's point of view. J Urol 111:356-360, Mar 1974

Treatment of the Frozen Shoulder

ADHESIVE CAPSULITIS of the shoulder is an established clinical entity associated with chronicity and numerous therapeutic regimens.

It is characterized by pain in the shoulder during the first three months, then loss of pain but persistent limitation of motion in the next three months. Spontaneous recovery is reported in 60 percent of patients.

Types of treatment vary: (1) orally administered medicine of the phenylbutazone series; (2) exercises, active and with avoidance of gravity during the painful "hot" period of the first three months with avoidance during this phase of vigorous or passive manipulative exercises; active assistive exercises during the subsequent painless "frozen" phase; (3) if arthrography shows a "cuff tear," orally administered anti-inflammatory agents and active exercises or (4) suprascapular nerve block combined with active exercises.

More recently, there have been encouraging results from local injection of depot corticosteroids in the supraspinatus tendon, biciptal tendon and capsular area given in a series. However, emphasis is still placed on pain relief and gradual regaining of the range of motion.

RENÉ CAILLIET, MD

REFERENCES

Steinbrocher O: Frozen shoulder: Treatment by local injection of depot corticosteroids. Arch Phys Med Rehabil 55:209-213, May 1974

Cailliet R: Shoulder Pain. Philadelphia, FA Davis Co, 1966

Weiss JJ, Thompson G, Doust V, et al: Arthrography in the diagnosis of shoulder pain and immobility. Arch Phys Med Rehabil 55:205-209, May 1974

Fibrillation Potentials in Upper Motor Neuron Disease

CLINICAL ELECTROMYOGRAPHY (EMG) is a useful tool in helping to distinguish normal from abnormal functions of muscles. The finding of fibrillation potentials on EMG in patients with hemiplegia secondary to cerebrovascular accident was first reported in 1967. This finding was confirmed and the subject reviewed in a recent article by Kruger and Waylonis. Fibrillation potentials have also been reported in patients with upper motor neuron paralysis secondary to spinal cord injury. The possible explanation for the origin of these abnormal potentials in patients with upper motor neuron disease is discussed in the recent article by Taylor, Kewalramani and Fowler.

Fibrillation potentials are probably the most common and certainly the easiest to recognize of the abnormal potentials observed in clinical EMG. Early clinical studies plus experimental studies with animals and man led to the concept that fibrillation potentials are characteristic of (lower motor neuron) denervation. As a result, the term fibrillation potential has become synonomous with "denervation" in clinical practice. In light of the above reports of fibrillation potentials in patients with upper motor neuron disease, plus the experimental studies by Josefsson and Thesleff demonstrating that fibrillation potentials occur in experimental animals when release of acetylcholine is blocked with botulinus toxin, the concept that fibrillation potentials are synonomous with dener-